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The challenges of rehabilitation after COVID-19

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Abstract: Due to the outbreak of the COVID-19 pandemic, social life and the clinical state of change of state. This disease is caused by the SARS-CoV-2 virus and is characterized by high infectivity and mortality. Due to the diversity of the tested tests, it will be difficult to obtain uniform characteristics, resulting in a uniform recovery plan for each patient. Rehabilitation, repair, execution, restoration to health, independence and reduction in value due to COVID-19.

Key words: physiotherapy, rehabilitation, pulmonary rehabilitation, COVID-19, SARS-CoV-2, pandemic

Introduction:

COVID-19 is an acute respiratory infectious disease caused by SARS-CoV-2 virus infection that was first diagnosed in November 2019 in Wuhan, central China. Due to the fact that it is very contagious, the disease has spread all over the world in a very short time. It spreads from person to person through the secretions of the respiratory system - by droplets, through aerosols, and also through the fecal-oral route. Studies have shown a relationship between the SARS-CoV-2 virus and the previously known SARS virus, but due to a change in the structure of the receptor binding domain (RBD) of the SARS-CoV-2 spike protein associated with the angiotensin 2 (ACE2) cellular receptor, SARS- CoV-2 has a greater ability to spread. The SARS-CoV-2 virus protein has a 10-20 times greater affinity for ACE2 than the SARS virus [1].

The main symptoms of SARS-CoV-2 infection include fever (89%), cough (68%), shortness of breath and tightness in the chest (19%), muscle pain, fatigue (38%), headache, changes in the sense of smell and taste . Haemoptysis, loss of appetite, nausea, vomiting, diarrhea and abdominal pain may also occur. In addition to the symptoms of active infection, COVID -19 carries a number of complications, including acute respiratory distress syndrome (ARDS), acute kidney injury, anemia, heart failure and secondary infection [2].

Due to the diversity of clinical features and the difficulty of joint classification, the disease was divided into the following forms:

- mild, during which there is no shortness of breath, and the blood oxygen saturation (SatO 2) is at the level of 95-99%;

- moderate: dyspnea is present, SatO 2 94% to 98%, radiological examination shows signs of pneumonia;

- severe: severe dyspnoea, SatO 2 ≤ 93%, respiratory rate (RR)> 30 / min, progression of radiological changes, O 2 administration is necessary, possibly non-invasive ventilation;

- critical: patients need mechanical ventilation [3].

Based on data from 30/03/2020, people with the highest risk of developing a severe form of COVID-19 who will require hospitalization and / or ICU support are elderly people, men,

with at least one coexistence, with a higher stage of the disease (measured by using the SOFA scale). Severe and critically ill patients are those at increased risk of long-term sequelae such as pulmonary fibrosis.

The inefficient work of the respiratory system translates into the functioning of the entire body due to a dysfunctional breathing pattern and, consequently, hypoxia. Patients after COVID-19 show reduced exercise capacity, which may be due to impaired lung function. In addition to respiratory function, studies of survivors of SARS showed deficits in cardiopulmonary fitness (6-minute walk test - 6MWT) and musculoskeletal (manual dynamometry for major muscle groups) as well as quality of life (QoL) deficits compared to the norms age-appropriate [4].

Following severe and critical COVID-19, patients may experience memory and executive deficits, and older patients may experience confusion and executive problems as the virus directly affects the CNS. The most frequently reported mental health problems (by patients, relatives and healthcare professionals) were anxiety, depression, fear and anger, and post-traumatic stress disorder. In patients after critical and severe COVID-19, a mental complication differs from delirium due to the effect of hypoxia and brain changes. In older patients, this may be an effect of isolation [5].

Rehabilitation.

Pulmonary rehabilitation is the basic element of patient therapy during and after COVID-19. Prior to this, a thorough patient assessment is carried out, on the basis of which it is possible to tailor the rehabilitation plan to the individual patient's needs. The goal of pulmonary rehabilitation of COVID-19 patients is to alleviate the symptoms of dyspnea, relieve anxiety, reduce the complications of respiratory failure, minimize the risk of disability, maintain function, and improve quality of life [6].

Chest computed tomography in COVID-19 patients revealed different patterns of lung involvement:

1) a multifocal, overperfused ground-glass phenotype, with centrilobular nodules, patchy consolidation, and intra-bronchial air bronchogram;

2) dilatation and congestion of septal capillaries, followed by exudation into the alveolar space with interstitial edema;

3) vascular exudation in the interstitium, with consolidations filled by air bronchogram;

4) fibrous exudation with multiple consolidations;

5) thickening of bronchial walls, the interlobular septum, and patchy consolidations.

This explains why COVID-19 patients have an extremely variable clinical course and why individualization of the physiotherapy plan is required [7].

In the interests of the safety of medical personnel, it is recommended to conduct therapy through telemedicine, in limited contact or with the use of all personal protective equipment, i.e. gloves, masks, glasses and an insulating apron. In particular, during home pulmonary rehabilitation, instruct patients to cover their nose and mouth with a tissue when coughing or sneezing so that the material can be removed immediately, and to emphasize the role of washing and disinfecting hands after contact with respiratory secretions and contaminated objects / materials [5]. When working in contact with the patient, medical personnel should use techniques that require minimal manual handling of patients, such as remote control of the bed, mechanical support for limb exercises and closed-circuit suctioning of secretions [7].

Patients must remain in isolation for at least 2 weeks immediately after recovery. During this phase, patients should be advised to exercise at low to moderate intensity, according to individual abilities. Then, when contacting the patient, follow all sanitary regime rules to minimize the spread of the virus. Necessary elements are properly ventilated rooms and disinfection of rehabilitation rooms. Dietary and psychological consultations play an important role in the comprehensive rehabilitation of a patient after COVID-19 [8].

Physiotherapy has been shown to be effective in improving long-term physical performance among ICU survivors, but ICU chest rehabilitation remains controversial, especially in patients with already diagnosed alveolar damage. According to the Italian Association of Physiotherapists of the Respiratory System (ARIR), some procedures should be limited, including diaphragmatic breathing, bronchial hygiene, lung expansion techniques, manual mobilization, respiratory muscle training, nasal rinsing and exercise training in the acute

phase of COVID-19 disease, as they lead to significant changes in respiratory function, as well as hemodynamic changes in the circulatory system and the brain [5].

In patients requiring mechanical ventilation, the primary goals are to improve self-ventilation of the lungs and to prevent hypoxia. This can be achieved by clearing the airways with modified positional drainage (prone position and frequent repositioning) and closed-circuit suction of secretions. To improve skeletal muscle health, active, active assisted, passive, and bedside electrical muscle stimulation can be included in the treatment plan. The introduction of gait is possible only after stabilization of vital signs. The need to monitor oxygen saturation (SpO 2) with a pulse oximeter is essential throughout the rehabilitation phase of an intensive care unit, regardless of the presence of other pre-existing comorbidities [9].

Physical exercise is an essential component of pulmonary rehabilitation and may begin with movement in bed, including anticoagulant exercise, in a very debilitated patient to walking in an outpatient setting. If SpO2 falls below the target value (<90%) or the patient determines a Borg fatigue level> 3, physical activity should be discontinued and may be resumed when SpO2 reaches the target value (> 90%) [10].

Airway clearance techniques are designed to help clear the airways by mobilizing mucus in the cephalic direction from the peripheral to the upper airways, increasing the volume of the lungs, and eliminating mucus through effective coughing. The use of airway clearance techniques can significantly reduce the need for assisted mechanical ventilation and hospitalization. Autogenous drainage is a commonly used technique that uses a combination of movements to mobilize and centralize secretions with short breaths to collect secretions in the peripheral airways, followed by normal breaths to collect secretions in the intermediate airway, and deep breaths and coughing to remove the secretions [5,7].

Body posture also plays an important role in the functioning of the respiratory system. Patients should be encouraged to keep their head and neck upright during respiratory treatment and whenever possible. External vibrations, if available, can be used at vibration frequencies less than 17 Hz to improve mucociliary clearance [5,7].

Discussion:

COVID-19, as a highly contagious and deadly disease, has a number of consequences throughout the human body, but particularly affects the respiratory system. Patients are also at

risk of cardiovascular and nervous system complications, as well as eating and psychosocial disorders. The heterogeneity of the clinical features of the disease and the involvement of the lungs make it impossible to create a uniform scheme of pulmonary rehabilitation. Scientists unanimously confirm the need to select techniques and intensity of exercises to suit the individual needs and possibilities of patients, taking into account comorbidities. More research on COVID-19 and its effects is needed to improve and optimize rehabilitation. The goal of afterimage physiotherapy is to restore the patient's independence as much as possible [7-8].

When it comes to helping others, the first thing medical professionals need to do is forget about themselves. Compliance with all sanitary recommendations, including the use of telemedicine, and in the event of direct contact, the use of protective gloves, masks, gloves and aprons will translate not only into the health of the staff, but also indirectly into the efficiency of health care and the spread of SARS-CoV-2 virus [7-9].

Comprehensive rehabilitation concerns not only the patient himself, but also his entire family. For patients who have undergone a critical COVID-19, it is important to support them in carrying out everyday activities, as well as to ensure the regularity and correctness of home therapy, or help in reaching outpatient rehabilitation. Including the family in the rehabilitation process is also important due to psychosocial disorders. Patients, especially the elderly, due to social isolation and fear for their own lives, are at risk of developing depression, anxiety, post-traumatic stress disorder, as well as dementia and delirium syndromes due to brain hypoxia.

Widely used in patients with respiratory failure, respiratory muscle training is a type of non-drug therapy that is in most cases safe, easy to learn and low cost to implement. For COVID-19 patients, pulmonary rehabilitation is beneficial in relieving symptoms of pneumonia, increasing cardiopulmonary endurance, and improving physical and mental health, while increasing patients' ability to gradually recover and participate in social activities. Studies have shown that in the stable phase, earlier rehabilitation intervention will bring better results.

Despite the many benefits of pulmonary rehabilitation, specialists from the Italian Association of Physiotherapists of the Respiratory System negate some of the therapeutic treatments that they believe negatively affect the functioning of the respiratory system, as well as the increase in pressure in the lungs and brain. These controversies concern patients in the acute phase of

the disease with diagnosed alveolar damage. According to the researchers, not all people who suffer from COVID-19 infection will require formal rehabilitation, and its need will depend not only on the severity of the disease, but also on the degree of pre-existing weakness and functional impairment [10].

The anticipated increase in the need for rehabilitation means that the ability to carry it out must also increase, which is a challenge for both current and future physiotherapists. In my opinion, an epidemic in the 21st century. is proof of the need for continuous development and education of medical personnel, as well as increased financing of the healthcare sector, so that patients have greater opportunities to use, inter alia, from comprehensive rehabilitation, group therapeutic activities or individual sessions conducted in their homes. I also believe that after undergoing COVID-19, all patients should be obliged and able to undergo screening tests that would enable the detection of post-complication complications and qualification for therapy [7-10].

Conclusions:

COVID-19 is a new disease that has not been fully characterized, but has significantly impacted people's lives. All physiotherapeutic interventions should be implemented as early as possible, carefully organized, and staff must always wear appropriate personal protective equipment to minimize exposure to the virus. Physiotherapists play a key role in restoring function and reducing disability as a result of the pandemic. Respiratory rehabilitation is additional tools in the fight against COVID-19 and includes, inter alia, airway clearance techniques, manual therapy and physical activity.

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